



Implementation of Reliability Testing, Monitoring and controlling using IoT in LEDTV

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Abstract

Considering the concept of existing IoT system, in this paper author have tried to implement the Industrial IoT system. Internet of Things is a system that combines communication system and embedded system together to connect hardware devices to the network or internet. The recent trend in the industries, also known as the Industrial Internet of Things (IoT), is the Industrial Internet, that uses internet/ industrial cloud and internet connected devices to industrial machines in processes. Industrial IoT empowers industrial engineering to create smart machines with detection, analyse, control and monitor with the help of IoT. The main aim of this paper is to implement Industrial IoT that controls as well as monitor industrial processes such as TV reliability testing which is a part of industrial processes. The parameters that are given in form of commands to industrial devices is ON/ OFF and ON/OFF cycle counts. Parameters that are monitored are TV's screen light and further if fault occurs it is communicated to testing person as Device fault occurred and Fault Occurrence Time.

1. Introduction

1.1 Introduction:

The Internet of things comprised of physical objects that are embedded with home automation devices, sensors, actuators, processing ability, software, and other technologies that connects and exchange data with other devices and systems over the Internet or other communications networks. Just like the existing system of Internet of Things in general, the Industrial IoT covers industries and its many applications. Author is focusing on the optimization of operational efficiency, automation with the use of embedded electronics and communication systems. Industrial Internet of Things opens doors for plenty of opportunities in enhancing automation, optimization, intelligent manufacturing and smart industry, detection, analyse, control and monitor industrial machines. The more mature goal of industrial IoT is digital transformation.

The purpose of the Industrial IoT is not to replace human or human work, but to enhance and optimize automation level in industries. One of the greatest advantages of Industrial IoT has seen as reduced human errors and man work, thus enhances overall efficiency. With improved efficiency industry can achieve both money and time optimization.

As we all know the market challenges in many industrial markets, it's normal that in initial stages connectivity in the IIoT is focusing only a restricted set of processes and its benefits. Yet, it's important to have plan for the longer term. Author have developed prototype for TV reliability testing, which is a part of TV manufacturing industry, using IoT. This prototype can make TV ON and OFF multiple times under testing and monitor screen light fault occurrence time.

2. Project Description:

2.1 Block Diagram:

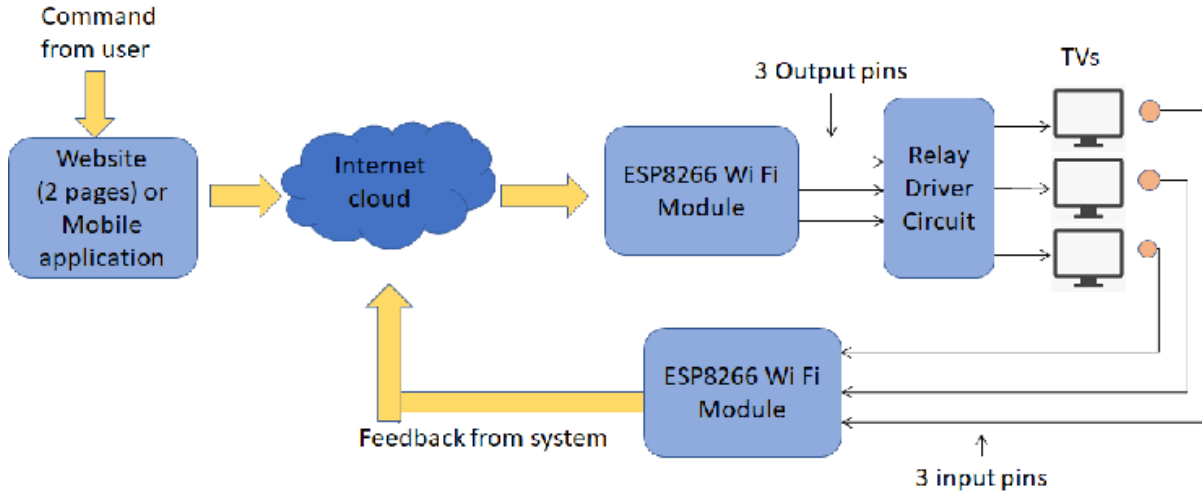


Fig.1 Block Diagram of TV Reliability Testing, Monitoring and controlling using IoT

In Block Diagram of Proposed system consists of user side i.e. internet connected website operated by testing person in industry where 2 webpages are configured in one websites, one is for giving command and another is for receiving feedback. For demonstration three different industrial applications i.e. TVs are taken under considerations. Considering three TVs under testing, commands such as Device ON and OFF, and ON/OFF cycle count can be configured in webpage. Testing person enters count let's say 500 count in webpage for all three devices and make devices ON. Count that has been entered will get communicated to ESP8266 Wi-Fi Module over internet and its output pins of WiFi Module can be made High and Low accordingly with prefixed delays.

On another end where TVs are located in dry heat chamber, humidity chamber or switching test area, photo sensors attached to TV's screen detects screen light. And foe example screen got OFF in-between ON/OFF cycle and remained OFF for more than 1 minute, it get detected by ESP8266 input pins. Then ESP8266 sent "Device OFF" message over internet and further to webpage. Device OFF time logged in webpage noting actually operating time of device. Testing person noted actual "Device operating OK" time.

To drive three electrical devices i.e. TVs (operating on 230 V) Relay driver circuit is used, which takes input from ESP32 Output pins and switches between ON and OFF.

2.2 Hardware and Software Development

Table 1. Hardware and Software used in proposed system

Sr. No	Hardware/ components and Software	Specification
1	ESP8266 Wi-Fi Module	Tensilica L106 Diamond series 32 bit processor and on-chip SRAM, 17 GPIO.
2	Wi-Fi Modem	Any Modem used in industry with maximum range.
3	Relay Driver circuit	Cubic, single pole 10A power relays with ULN2003 relay driver IC.
4	TVs or any other electrical device for demonstration	Operating on 230 V consumes < 5A.
5	Software for webpage development	Blynk IoT
6	Software for ESP8266 programming	Arduino IDE

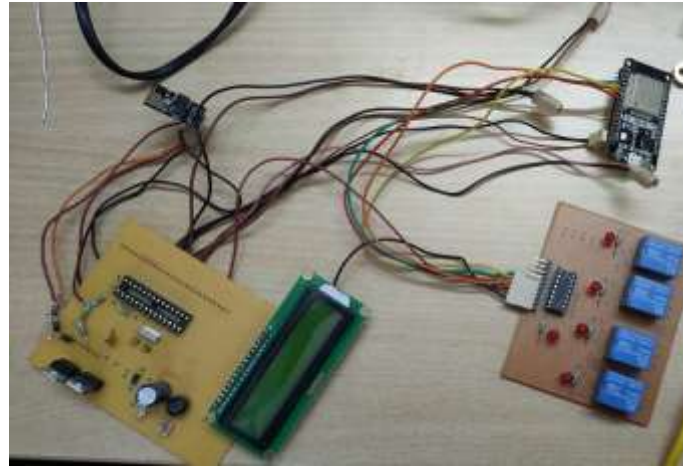


Fig 2. Hardware used in proposed system

2.3 Results and observation of proposed system

Table 2: Observation from proposed system

Sr. No.	Device No.	Count entered for ON/OFF cycles	Testing Start Time	Fault Occurred or not	Fault Occurrence Time
1	1	20	09:00	Yes	09:10
2	2	30	09:25	No	--
3	3	25	10:00	Yes	10:10

3. Conclusion:

The proposed system used in this project makes use of Website on personal computer, internet cloud, ESP8266 Wi-Fi Module to give command in terms of ON/OFF cycles to remote located devices for operation and to take feedback from sensors to know the status of remote devices. According to feedback testing person took decision and noted the actual operating time and fault occurrence time.

By providing extremely detailed data in real time, the IIoT helped industry to understand their business processes better and, by analysing the data coming from sensors, can make their testing processes or any other industrial processes more efficient and even open up new revenue streams. Industrial IoT based system implemented by author and results are presented in this paper. It is observed that, system is capable of doing automatic switching test operating on 230 V, which is a part of TV reliability testing. Testing person succeeded to enter ON/OFF count for TV which is editable. Also when in between screen light went OFF, IIoT successfully gave feedback to testing person as “Device fault occurred” and “fault occurrence time” got logged providing actual operating time.

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